for any reason we required extreme accuracy, was shattered to pieces (Fig. 1).

In No. 42 this instrument was externally complete, with the exception of a crack in the small unprotected bulb on the right limb of the U-tube. The inner shell of the protected bulb was broken to pieces (Fig. 2).

In both of these cases there seems little doubt that the damage occurred through the giving way of the unprotected bulb. In No. 39 the upper part of that bulb was ground into coarse powder, and the fragments packed into the lower part of the bulb and the top of the tube. The large bulb and its covering shell were also broken, but into larger pieces, disposed as if the injury had been produced by some force acting from within. The thermometer tube was broken through in three places; at one of these, close to the bend, it was shattered into very small fragments. The creosote, the mercury, and bubbles of air were irregularly scattered through the tube, and it is singular that each of the steel indices had one of the discs broken off. The whole took place no doubt instantaneously by the implosion of the small bulb, which at the same time burst the large bulb and shattered the tube.

In No. 42 a crack only occurred in the small bulb, either through some pre-existing imperfection in the glass or from the pressure. When the pressure became extreme the crack yielded a little, and the sea-water was gradually forced in, driving the contents of the thermometer before it, and taking it at a disadvantage from within, breaking the shell of the large bulb, which was unsupported on account of the belt of rarified vapour between it and its outer-shell. The pressure was now equalised within and without the instrument, and the injury went no farther. Alcohol, creosote, mercury, and sea-water were mixed up in the outer case of the large bulb, with the debris of the inner bulb, and one of the steel indices lay uninjured across the centre of it.

It now becomes an important question why the thermometer should give way at that particular point, and one still more important, how the defect is to be remedied. At first sight it is difficult to imagine why the small bulb should give way rather than the outer shell of the large one. The surface exposed to pressure is smaller, the glass is thicker, and it is somewhat better supported from within, as the tube is nearly filled with fluid under the pressure of an atmosphere. I believe the cause must be that the end of the small bulb is the last point of the instrument heated and sealed after the tube is filled with liquid, and that, consequently, the annealing is imperfect at that point. It is evidently of no use to protect the small bulb in the same way in which the large bulb is protected. The outer shell is merely a precaution to prevent the indications being vitiated by the action of pressure on the elastic bulb. Against crushing, it is no protection; rather a source of weakness, from its greatly increasing the surface. The only plan which seems to be feasible is to thicken the small bulb itself, and, if possible, to improve its temper. It is only fair to say that these thermometers were tested and guaranteed to only three tons on the square inch, and that the pressure to which they were subjected was equal to four tons.

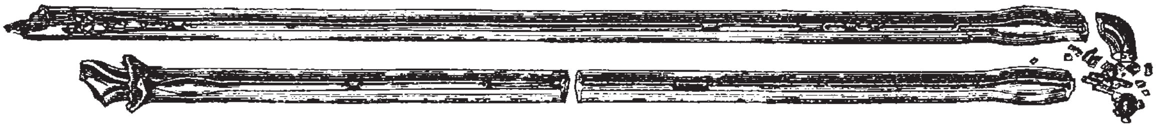

FIG. 1

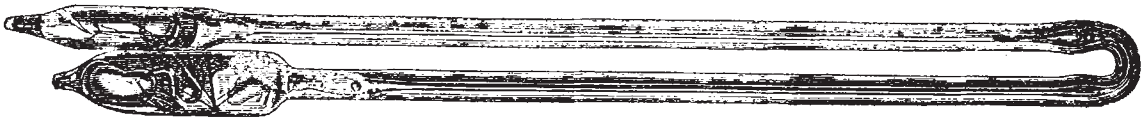

FIG. 2

WYVILLE THOMSON

NOTES

THE Albert Gold Medal of the Society of Arts has this year been awarded to M. Chevreul, Member of the Institute of France, and Director of the Gobelins and of the Jardin des Plantes at Paris, for his valuable researches in connection with Saponification, Dyeing, Agriculture, and Natural History, which, for more than half a century, have exercised a wide influence on the industrial arts of the world.

PROF. HUMPHRY announces that the Cambridge class for Practical Histology will meet during the months of July and August at the Anatomical Museum on Tuesdays, Thursdays, and Saturdays, at 9 A.M., commencing July 1. The Class for Human Osteology will meet on Mondays, Wednesdays, and Fridays at the Anatomical Museum at 9 A.M. during July and August, commencing July 2. The Professor of Zoology and Comparative Anatomy (Mr. Newton) announces that a class for practical work will be carried on in July and August by the Demonstrator in Comparative Anatomy, commencing July 2. The fee for the course will be one guinea.

THE following gentlemen have been recommended by the French Academy of Sciences to the Minister of Public Instruction for the four vacant posts in the Bureau des Longitudes:—M. Serret, M. Mouchez, M. Perrier, and M. Janssen.

THE Council of the Society of Arts having been informed that Her Majesty's Commissioners do not intend to publish reports on the different departments of the exhibition of the present year, have decided to undertake that duty, and for this purpose have engaged the services of gentlemen specially skilled in the subjects of the several sections, to prepare such reports for publication in the Society's *Journal*. A report on Ancient Objects, by Mr. C. Drury Fortnum, F.S.A., and another on Surgical Instruments and Appliances, by Mr. R. Brudenell Carter, F.R.C.S., appear in the *Journal* for May 30.

AT a meeting of the Council of the Leeds Naturalists' Field Club and Scientific Association, three of its members—Mr. Wm. Todd (vice-president), Mr. W. D. Roebuck (secretary), and Mr. John W. Taylor—were appointed a sub-committee to consider the best manner of collecting information for a series of catalogues of the natural productions of the district. The sub-committee having taken into consideration all the facts bearing upon the subject in hand, are of opinion that the following procedure should be adopted:—1. That in view of the approaching meeting in Bradford, in August next, of the British Association for the Advancement of Science, it is advisable that there should be produced by this society, and under its auspices, a brief account of the present state of our knowledge of the fauna, flora, and geological and topographical features of the district. 2. That for present use the most convenient district to illustrate would be the one produced by striking a circle of ten miles' radius, having the Leeds Town Hall for its centre. 3. That, as far as practicable, the lists should be complete, and as full as possible in detail as to the distribution of the species; and that they should be prefaced by a good outline sketch of the physical conformation and geological structure of the district. In conformity with these recommendations, the sub-committee would be glad to receive lists, as complete as possible, from all persons willing to co-operate in the work. These lists, to be available for immediate use, must be sent in before the 1st of July, 1873. Should the amount of information received up to that date warrant the Council in so doing, the lists will be placed in the hands of small committees of revision, whose province it will be to construct general catalogues combining all the information in the possession of the Society; and it is then hoped that during the first week in August, a small work may be published. The sub-committee will be very glad to receive all suggestions that may be made; and would be glad also to learn the names of all persons likely to be able to supply information. All communications to be addressed to the Secretaries, 9, Sunny Bank Terrace, Leeds.

WE have received the Report, for 1872, of Mr. B. A. Gould, superintendent of the Argentine National Observatory at Cordoba, and a very creditable report it is, both to Mr. Gould and his assistants, as well as to the liberality of the Argentine Government, which seems to have done all in its power to provide the necessary buildings and instruments. The buildings are not yet quite complete, though a number of excellent instruments have been acquired, and others are being provided. The principal work of the observatory has been the preparation of a Uranometry, which will contain a larger number of stars than the recently published one of Heis for the northern heavens; Heis's contains 5,421 stars. In the Uranometria Argentina, the brilliancy of the stars will be determined to single tenths of a limit of magnitude. There now remains nothing of importance to be done in the way of observation, since each star has been observed upon the average at least four times, and the degree of its brilliancy determined with the greatest precision possible. To prepare these results for publication, the position of every star will be computed for the commencement of 1875, a part of which labour has already been accomplished, and then to prepare the maps for reproduction by the engravers. The observation of the zones for the formation of an extended catalogue of stars between the 23rd and 80th degree of south declination, was commenced in September last, and is being carried on satisfactorily; as also is the photographic work of the observatory, a very considerable number of photographic impressions of clusters of stars having been made, which only need a knowledge of their zero of position to render them serviceable. Means are also taken to spread a knowledge of the exact time at regular intervals throughout the Confederation. Altogether the Argentine Observatory appears to be exceedingly efficient.

WE have received from Prof. A. Kerner, of Innsbrück, several interesting contributions to systematic and physiological botany —"Ueber die Schafgarben-Bastarte der Alpen," an account of the hybrid yarrows found in the Tyrolese Alps; "Novæ Plantarum Species, Decas iii.," containing descriptions of new Rubi of Austria and the Tyrol; and "Chronik der Pflanzen-wanderungen," in which he narrates the curious circumstances connected with the spread of a North-American plant, *Rudbeckia laciniata*. This plant first became known in Europe early in the seventeenth century, when it was introduced into the gardens of Paris; during two centuries and a half it has gradually spread over the gardens of nearly the whole of Europe, but appears only within the last twenty or thirty years to have escaped, and within that short space of time has become completely naturalised in a great number of places. In a communication to the Scientific and Medical Society of Innsbrück, Dr. Kerner states, as the result of his observations on Alpine plants, that the growth of the stem and even of the flowers of many species proceeds at the temperature of zero C.; the flowers may in some cases open, and even mature their pollen, beneath a thick covering of ice, the surface of the glacier being penetrated in innumerable places by their stems.

DR. A. KERNER reprints from the Proceedings of the Scientific Society of Innsbrück an interesting paper on the means of protection of the pollen of plants against premature displacement or damp. As the vitality of pollen is immediately destroyed by exposure to the action of either rain or dew, he finds in nature a variety of contrivances to protect it against these injurious influences during the interval between its escape from the anther and its being carried away by insects, these contrivances being generally absent in those plants where fertilisation is effected by the pollen being conveyed at once to the stigma by the wind. In plants with coherent pollen, fertilised by insect agency, where some of the anthers are so placed as to be necessarily exposed to the weather, these are generally found to be barren, or destitute of pollen, and where they would interfere with the entrance of insects into the flower, they are altogether abortive or rudimentary. Plants with coherent pollen, which require insect agency for their fertilisation, Dr. Kerner believes to be of more recent geological occurrence than those with powdery pollen, which require only the wind to convey it to the stigma.

THE proceedings of the Asiatic Society of Bengal contain remarks on winds, typhoons, &c., on the south coast of Japan, by Commander H. C. St. John, H.M.S. *Sylvia*. The most prevalent winds in the southern parts of Japan are from the north-east. Throughout an entire year the proportion was as follows, taking 1,000 hours as an index:—Between N. and E., 500; between N. and W., 200; between S. and E., 100; between S. and W., 0·99. During April, May, June, July, August, and September, N.E. winds prevail, hauling more easterly in June, July, and August. In August and September S.E. winds are more frequent than during any other months. In October variable winds prevail, and the N.W. wind begins. During November, December, January, and February the N.W. winds prevail and blow hard. In March the N.W. and N.E. winds are equally distributed. The S.W. winds most frequently occur during the early parts of September. It appears the winds on the southern coasts of Japan are easterly during April (spring), and hauling to the S. as the summer approaches, pass through S. and W. to N.W. during winter, coming again through N. to N.E. and E. in spring and summer. Typhoons occur between June and October, inclusive. From the middle of August to the middle of October they may be expected to occur most frequently. The usual tracks of these storms on the Japan coasts appear very regular; approaching from the S.E. travelling about N.W. On reaching the hot stream in about the latitude of the Bonin Islands, or between here and the Foochoo Islands, they begin to curve to the north, and following the course of the Kuro Siwo, strike the south coasts of Nipon. Owing chiefly to the high land along the coast, the northern disc of the storm becomes much flattened in, causing more easterly wind than would occur if the storm were in mid ocean. Retaining the course of the stream, they pass along in a north-easterly course, and, if not broken up previously, pass out into the Pacific Ocean on reaching Inaboya saki.

MR. JAMES WOOD-MASON has sent us a description of a Macrurous Crustacean, which he has made the type of a new genus, *Nephropsis Stewarti*. The specimen (a female) he describes was dredged in from 250 to 300 fathoms, about twenty-five miles off Ross Island on the Eastern coast of the Andamans. It is clearly allied to *Nephrops Norvegicus* of Northern European seas, its main difference being the absence of the squamiform appendage of the Antennæ. One of the most interesting points about the new crustacean is the loss of its organs of vision by disuse, a characteristic of several recently discovered crustaceans; this is compensated for by the great length and delicacy of the antennæ, and the great development of the auditory organs, the animal's habits being to burrow in the mud at the depth of about 300 fathoms.

It may be recollected that M. Alphonse Pinart, the French philologist, visited the Aleutian Islands and Alaska in the summer of 1871, for the purpose of collecting the vocabularies and the photographs of the different tribes. This material he carried back with him to Paris, where he has been engaged in working it up. We learn that he expects to revisit the United States this month, with ample funds in his hands from the French government, in order to effect an exhaustive collection of the antiquities of Alaska, his excursions to the different islands being made in a vessel especially fitted up for his use. Alaska is one of the finest fields in the world for ethnological and prehistoric research.

Professor Wyman has concluded, as the result of explorations among the shell mounds of Florida, U.S., during the past winter, that the aborigines by whom they were constructed must have been decided cannibals, as in eight different instances he has found considerable quantities of human bones in the shell heaps, the bones themselves being broken up and split, just as in the case of the bones of other animals. This, he is satisfied, was not the result of burial, but was done for the purpose of obtaining the marrow, probably after the flesh had been devoured.

Under the auspices of the Society of Biblical Archæology it is intended shortly to publish a series of translations of all the important Assyrian and Egyptian texts which exist in the various collections of England and the Continent, and thus place before the English student the remains of undoubtedly the oldest and most authentic literature in the world. Nearly all the principal translators have offered their services for this purpose, and while each author will be alone responsible for his portion of the work, the general arrangement of the materials will rest with the president of the society. The selection of the records will embrace the entire range of Egyptian and Assyrian history and literature. Each translation will quote the authorities upon which it is based, or the monument from which it is taken, and all other notes will be as few and brief as possible, to avoid controversy and expense. The first volume will be issued by Messrs. Bagster and Sons, at a price to bring it within the reach of all interested in such subjects.

The *conversazione* of the Society of Arts will be held at the South Kensington Museum on Friday evening, June 28.

The late distinguished chief of the U.S. Coast Survey, by his will, established a fund to be placed in the hands of executors, by whom the income is to be expended, under the direction of a committee of the National Academy of Science, for the advancement of some branch of physical research. The first report of results achieved through this bequest was recently made to the Academy by its President, Professor Joseph Henry. The committee had decided that in view of the great interest that Professor Bache had throughout his life manifested in terrestrial magnetism, it would be highly proper to further this science by gradually extending over the country the magnetic survey which, during his own lifetime, he had carried out in the Middle States. In the execution of this design they had been so fortunate as to secure, at small expense, the services of Dr. Hilgard, of St. Louis, by whom, in 1872, chiefly in the season most favourable for travelling, quite a large number of stations were occupied for the determination of the magnetic elements. These stations are mostly in the Southern States, and it is the intention of the committee to extend the work annually, northward and westward, as the income from the fund may allow.

The U.S. Army Signal Office has made preparations for a great extension of its valuable system of reports of the heights of rivers, particularly of all those opening into the Mississippi. Over twenty-five stations are now established at suitable points on these rivers, especially, of course, on the Ohio, Missouri, and Mississippi. They are provided in some instances with automatic self-recording apparatus, and at all other places the observation of the height of the water is taken eight times daily when floods are apprehended. By this most beautiful system every wave of high water is accurately followed in its course down stream, and the approach of dangerous high floods is easily foretold by the repeated telegraphic reports. The system of river reports, which has been in operation during the past year, has given such universal satisfaction to those navigating the Western waters that the demand for increased facilities can only be met by this new and far more elaborate system of stations.

The results of the explorations in the Gulf of St. Lawrence prosecuted during the months of July and August, 1872, by Messrs. Whiteaves and Bulger, have just been published. The area examined extended from a little above Cape Rozier to the Magdalen Islands. A depth of water somewhat over 200 fathoms was found near the centre of the mouth of the St. Lawrence, between Cape Rozier and the south-west point of Anticosti; the greatest depth actually met with was 313 fathoms, about half-way between the east point of Anticosti and the Bird Rocks. Large collections were made, embracing several species new to science. Among the novelties discovered was a sponge belonging to a genus but recently indicated in the "Depths of the Sea." About thirty-five species of corallines were obtained, large numbers of them being new. Numerous fine specimens of *Virgularia* were procured, the same kind having been found by Dr. Packard on the Georges Bank, and three species of sea-anemones were secured in addition to those of last year's collection. Two undescribed specimens of a coral (both dead) were also gathered at a considerable distance from each other. The relations of these new species are rather to the tropical forms than to those which we already know on the coast of the North Atlantic.

A shock of earthquake, lasting for several seconds, was felt at Attok on the morning of Sunday, April 27.

We have been favoured with a copy of the *Japan Gazette*, from which we take the following notes:—A huge cephalopod is now being shown in a house near the temple at Asaka, Yedo. It seems that a fishing-boat was seized by its tentacles whilst off the village of Kononoto, in the district of Kisaradzou, and that the boatmen killed the creature by repeated blows. Its length from the tail to the insertion of the tentacles is about sixteen feet; one of the arms is from its junction with the body to the sucker at its point nearly five feet. The polypus has shrunk since its death, so that living, it would probably measure considerably more.—The anomalous absence of earthquakes during the past winter has excited some speculation as to the causes of such quiet, in a country usually very tremulous towards the coming of spring. Whatever may be the real causes, the remarkable volcanic activity in Japan, during the past winter, and at present, is an interesting collateral phenomenon. From nearly all parts of the empire, during the last two months, have come tidings of mountains quaking and bursting in fissures, volcanoes casting out stones, ashes, and mud, and in some instances flame and hot lava. Smoke and steam from Asamayama have been visible from Yedo, several times this winter. In addition to the eruptions in Yechiu, Mito and Higo, the latter being especially severe and damaging to the cultivated land around it,—another mountain is reported as being affected with volcanic symptoms. Kurokami-yama, near Nikko, which has, so far as is known, always been very quiet, was shaken with a great shock on March 12, at 3 P.M. The shock was accompanied by loud noise, and a strong smell of sulphur, which remained about six hours.

ADDITIONS to the Brighton Aquarium during the past week: a Porpoise (*Phocæna communis*) from Rye Bay; a Sturgeon (*Accipenser sturio*), 6 feet long, captured by the Bognor fishermen; Smooth Hounds or Skate-toothed Sharks (*Mustilus vulgaris*); White Hound or Toper (*Galeus canis*); Thornback Skate (*Raja clavata*); Sting Rays (*Trygon pastinaca*); Grey Mullet (*Mugil capito*); Flounders, fresh-water variety (*Pleuronectes flesus*); Butterfish or Gunnel (*Centronotus gunnellus*); Allis Shad (*Clupea alosa*); Salmon (*Salmo salar*); Ballan Wrasse (*Labrus maculatus*); Crabs (*Cancer pagurus*); (*Portunus puber*); (*Polybius Henslowi*); (*Carcinas Mœnas*); Zoophytes (*Actinoloba dianthus*); (*Tealia crassicornis*); (*Sagartia miniata*); (*S. nivea*).

THE additions to the Zoological Society's Gardens during the past week include a Bengalese Cat (*Felis bengalensis*) and two Indian Crows (*Corvus splendens*) from Arracan, presented by Mr. W. Dunn; a New Caledonian Rail (*Ocydromus lafresnayanus*), presented by Dr. G. Bennett; an Indian Porphyrio (*Porphyrio indicus*) from the Navigator's Islands, presented by Rev. J. Whitmee; a dwarf Chameleon (*Chameleon pumilis*) from South Africa, presented by Miss Siddons; an African Tantalus (*Tantalus ibis*); three Molucca Deer (*Cervus moluccensis*); a Vociferous Sea Eagle (*Haliaëtus vocifer*) from Africa; a European Lynx (*Felis lynx*), and a Glutton (*Gulo borealis*) from Norway; a collared Amazon (*Chrysotis collaria*) from Jamaica; two common Spoonbills (*Platalea leucorodia*) from Europe, and two Wattled Cranes (*Grus carunculatus*) from South Africa, purchased; an American White Crane (*Grus americana*), received in exchange; three American Mocking Birds (*Mimus polyglottis*) hatched in the Gardens; and an Australian Thicknee (*Oedicnemus grallarius*) deposited.

SCIENCE IN ITALY

THE Transactions of the Academy of Sciences of the Institute of Bologna for the academical year 1871-2 contains twenty-nine memoirs read by members at the sittings of the Academy and several communications from without. I find it quite impossible to do justice to these without exceeding permissible limits, but will briefly refer to a few.

In a paper on a probable connection between solar eclipses and terrestrial magnetism, Dr. Michez, after describing the magnetic phenomena observed in Italy and more especially in Sicily during the eclipse of December 22, 1870, and pointing out the difficulty of separating the disturbances due to the eclipse from those otherwise produced, states the result of his laborious and careful study of the Greenwich magnetic records in relation to the passage of the lunar shadow over any part of the earth. Having determined the average *ordinary* declination and amount of agitation for the particular hour and season corresponding to that of each eclipse, he compares these with the declination and agitation observed while an eclipse was in progress, and collecting all these results and averaging the deviation of the eclipse periods from those of ordinary corresponding times, he concludes that an eclipse of the sun exercises a real influence on the declination needle, that this influence extends through several hours before and after the period of greatest solar obscuration, and that it is manifested by a greater agitation of the needle, and an eastward deviation. Upon theoretical considerations, Dr. Michez shows that the moon's shadow regarded in its relations to humidity should always produce an eastward deviation, but as regards the magnetic properties of oxygen should produce either an eastward or westward deviation, according to the position of the place of observation in relation to the shadow. Assuming that the latter, on a sufficiently large average, will neutralise each other, the residual phenomenon should be a slight eastward deviation.

In a paper on "The Climate of Europe during the Glacial Epoch," Dr. Bianconi, following De la Rive and Villeneuve, shows that the glacial extension of that period may have been due to greater humidity of climate rather than a lower mean temperature. Dr. Bianconi's conclusions are almost identical with those I suggested about fourteen years ago when describing a curious summer accumulation of ice in a previously unvisited Norwegian valley, where the snow line is actually lowered to an extent of about 3,000 feet, simply by a local increase of atmospheric humidity caused by the drifting spray of a double waterfall.* The subject was subsequently treated by Dr. Frankland in a lecture at the Royal Institution.

Prof. Filopanti contributed an interesting paper on the movements of the atmosphere, in which, after referring to the conclusions of Maury, that on both sides of the equator up to about the 30th parallel constant easterly winds prevail, from the 30th to the 35th variable winds, but still with the easterly predominating; from the 35th to the 40th, variable wind, with a commencement of westerly prevalence; and from the 40th to the Pole westerly winds decidedly prevailing. The object of Prof. Filopanti was to find a theoretical reason for these particular limits. To do this he regards the atmosphere as subject to the operation of two forces, viz. the resistance of the earth, and the mixture of aërial columns due to variations of temperature of the earth's surface. If only the first of these influences operated, the atmosphere would ultimately partake in every part of the velocity of the terrestrial parallel on which it rested, and there would be no sensible winds; if only of the second, the atmosphere would ultimately acquire throughout an absolutely equal velocity of rotation. He works out mathematically the amount of this velocity, and finds it equal to that of the surface of the earth at the latitude 35° 50′ 52″, which is a close approximation to the 35° of Maury. This he considers would be the uniform velocity of the air if the land and the sea were perfectly smooth, and he therefore designates the parallels of 35° on either hemisphere the "neutral parallels." Hence we are justified in theoretically anticipating that between the neutral parallels and the equator actual mean rotatory velocity of the air will be less than that of the earth, that is, the prevailing winds will be easterly, and that between the neutral parallels and the Poles the prevailing winds should be westerly, as there the mean rotatory velocity of the air should exceed that of the earth. The friction of the earth will be continually struggling to correct these differences of velocity, while the north and south movements, due to differences of temperature, will contest for their maintenance and augmentation. Prof. Filopanti goes further into details of special atmospheric currents to illustrate and confirm the above, but space will not permit me to follow him there. I have, however, so far sketched in abstract his leading idea as it appears to be an important contribution to the theory of atmospheric movements, and as far as I know is original. To some extent it is applicable to the vexed question of ocean currents.

The "Hermaphroditism" of eels has occupied a good deal of the attention of the Bolognese Academicians. Prof. Ercolani described a number of his own observations and experiments, showing that this hermaphroditism is "perfect," and the subject was further discussed at two subsequent meetings, when the results of previous researches of Vallisneri, Valsava, Allesandrini, Mondini, and others, were stated and compared. Besides the above and some others on subjects of general interest, are a few purely mathematical papers, and several on pathological, medical, and local subjects, which I must pass over.

Considering that Bologna itself is but a provincial town, and that the whole province of Bologna contains a population about equal to that of Birmingham, these Transactions of the Bologna Academy of Sciences indicate an amount of scientific activity in the highest direction of scientific research that we are unable to rival in any corresponding provincial district of Great Britain.

W. MATTIEU WILLIAMS

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* "Through Norway with a Knapsack," Chap. xv.